DOCUMENT RESUME

ED 088 177 EA 005 909

AUTHOR	Keenan, J. M.; And Others
TITLE	A Benefit-Cost Structure for PACE I.D.: An Early Identification and Intervention Project. Management Systems Programs.
INSTITUTION	Management Systems Programs, Kalamazoo, Mich.; Western Michigan Univ., Kalamazoo. Dept. of Management.
REPORT NO	MSP-TR-69-1
PUB DATE	15 Jul 69
NOTE	25p.
EDRS PRICE	MF-$0.75 HC-$1.85
DESCRIPTORS	*Cost Effectiveness; *Economic Factors; Educational Economics; Educational Research; *Program Costs; *Program Evaluation
IDENTIFIERS	Opportunity Costs; PACE; *Projects to Advance Creativity in Education

ABSTRACT

This report attempts to assess the economic benefits and costs of the PACE (Projects to Advance Creativity in Education) Early Identification and Intervention Project. The report is structured to provide an indication of impacts generated by the Project, with some estimates of its direction and relative magnitude. The first section on impact analysis indicates a set of apparent relevant variables with estimates of the direction of effects (cost or benefits) and identifiable transfer payments. The break-even section indicates some benefit considerations and discusses break-even analysis as a way to justify project expenditures. Potential sources of opportunity losses are indicated. The research commentary section includes remarks by various participants, which tend to be personal values related to social work and research design. However, they have been documented to indicate major sources of bias and variance in the Project design. (Author/DN)

EA 005 909

ED 088177

MANAGEMENT SYSTEMS PROGRAMS

western michigan university at kalamazoo

ED 088177

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

A BENEFIT - COST STRUCTURE FOR PACE I.D.: AN EARLY IDENTIFICATION AND INTERVENTION PROJECT

J. M. Keenan
G. S. Booker
A. H. Leader

MSP/TR/69-1
July 15, 1969

EA 005 909

MANAGEMENT SYSTEMS PROGRAMS

a non-profit organization

facilitating management

education
publication
research

in association with

Department of Management
School of Business
Western Michigan University
Kalamazoo, Michigan

The publication series of the Department of Management includes:

Working Papers (WP)
Scholars Series (SS)
Student Papers (SP)
Technical Reports (TR)

These papers are published by the

Business Research and Service Institute
Western Michigan University
Kalamazoo, Michigan 49001

ACKNOWLEDGEMENTS

In addition to the PACE ID staff a number of people have been of considerable assistance. David Guinn did much of the field work on site in California. He interviewed a number of local agencies, collected documentation, and identified available data sources. John R. Murray interviewed, personally and by telephone, scientists and social workers across the country working on similar projects. A number of our colleagues, both at Western Michigan University and at other schools around the country have contributed their ideas to this portion of the project.

INTRODUCTION

In view of the severe economic constraints, it was necessary for the project team to adopt a limited set of objectives. It was impossible to develop a full-scale benefit/cost analysis or even a complete structure for analysis.

The analysis can be viewed from several reference points; the child himself, actors in the surrounding environment (eg. other children, or other families in his neighborhood), his family, various formal governmental organizations (school district, city, county, state, and the office of education) and the general public. Often a benefit to one segment is a cost to another group leaving the difficult problem of estimating the social value of transfer payments. The project could be examined internally to determine if the stated objectives have been met, however, this is not equivalent to evaluating whether the project had a net benefit to the general public.

Incidental (and even accidental) side benefits may indicate a net positive value. However, when accounting for total social worth, the opportunity losses inherent in the project must be evaluated. The character of the opportunity losses for PACE I.D. can only be roughly identified and not costed precisely or accurately at this stage.

A traditional cost/benefit analysis would have little value as the benefits associated with the project objectives have a time horizon beyond the scope of either this analysis or direct project funding. The cost structure of the PACE program may be found in other documents. As no valid estimates of pay-offs can be made, a differential cost analysis has not been

performed. Lacking reliable and valid outputs and measures of effectiveness, tentative breakeven points are about as far as the analysis can be reasonably carried.

The general conclusions of the project team are that the major benefits of the project lie with a social worker's support of a given group of families and the exposure to the potential of social work for personnel of the constituent school districts. A relatively small probabilistic return will "pay" for a social worker's time based on an estimate of economic contribution of discounted lifetime earnings.

In this sense, the effort clearly yielded net benefits to the community at large. On the other hand, we do not feel that this project has provided an effective demonstration that the identification and intervention techniques utilized are more effective or economical than alternative methods.

Hence, we have structured this report to provide the reader with an indication of impacts generated by the project, with some estimates of direction and relative magnitude. The report is sectioned as:

Impact Analysis

Breakeven Analysis

Research Commentary

Conclusions

The first section indicates a set of apparent relevant variables with estimates of the direction of effects (cost or benefits) and identifiable transfer payments.

The breakeven section indicates some benefit considerations and discusses break-even analysis as a way to justify project expenditures. Potential sources of opportunity losses are indicated.

The research commentary section includes remarks by various participants. These tend to be personal values related to social work and research design, however, they have been documented as they appear to indicate major sources of bias and variance in the project design.

IMPACT ANALYSIS

We have chosen to cluster the relevant individuals and institutions to avoid unnecessary redundancy of detailed transfer payments and the implication of precision and accuracy.

The categories used in the Impact Matrix (see Figure 1) include: 1) the child, 2) his family, 3) other actors (other children, neighborhood etc.), 4) Regional (city, county, state), and 5) Federal (USOE, general public etc.).

Figure 1

Impact Matrix

	Relevant Parties and Organizations*				
	1	2	3	4	5
Direct attention to learning/emotional problems	B**	B			
Reduced opportunity for self-responsibility***	C				
Increased learning rate	B				
Less punishment for variances from group norms	B				
Increased conditional value of number of years of education	B	B			
Reduces P (Social disability, mental health, delinquency, etc.)	B	B	B	B	B
Increased lifetime standard of living	B				
Increased positive reinforcement from society	B				
Ratio of positive/reinforcement/punishment increased	B				
Identified as "different"	C				
Damming of aggression identified and dissipated	B	B	B	B	
Increased teacher time			B		
Lowered distraction rate			B		
Decreased variety in environment			C		
Decreased emotional "costs"		B			
Reduced absenteeism from school; (nigher home costs)		B		T(-state) (+local)	

* 1. the child, 2. family, 3. other persons, 4. Regional government, 5. Federal

** B = Benefit, C = Cost, T = transfer payment.

*** Note that many if not most benefits to individuals are also social benefits to column 5 - only direct benefits and costs will be noted.

	1	2	3	4	5
Reduced parent/teacher conferences and entire complex of school/parent problems		B		B	
Potential transference by child		C			
Status re neighbor reaction to social worker visits		C			
Presumed clarification of family problems & Proficient		B			
Polarization of conflict by introduction of new party		B C			
Year-round service by social agency		B			
Teacher time	B	B	B	C	
Principal time				C	
Service and overhead costs				C	
Other social workers time				B	
Expanded usage of school psychologist				B	
Reduced community property losses from juvenile delinquency (expected value)				B	
Reduction of delinquency (EV)				B	
Reduced loss of state aid				T	
Parental demands for increased school services				C	
Processing parents complaints				T	
Alternative uses for aid				C	
Reduced or shifted welfare costs				T	T
Reduced juvenile delinquency				B	
Increased tax base				B	B
All economic values accruing better citizenship				B	B

	1	2	3	4	5
Acceptance of social worker in the home				B	
Presumed saving regarding children & aid				T	T
Demonstration effects					(B)
Reduced R & D expense					(B)
Test project					(B)
Direct cost of project					C
Opportunity losses	(C)	(C)	(C)	(C)	(C)
Increased S/T ratios				B	B
Increased teachers' effectiveness	B			B	B
Increased teacher morale				B	
Indicates potential resource shifts				B	B
Earnings	B			B	B
Intergeneration & effects	B	B	B	B	B
Substantial "investment" benefits*	B	B	B	B	B
Different teacher training needed				C	C
Lower cost of hiring teachers				B	B

* Corrective rather than supportive therapy (see next section)

BREAK EVEN ANALYSIS

Considering the extended time horizon necessary to measure benefits, at best, gross estimates can be made and a break-even region approximated. There are a variety of direct and indirect potential measures available; the major categories relating to crime, health, and lifetime earnings. The intervening variable of educational level makes the probability of high school gradua ion as the largest incremental change. Affects of differential levels of education can be seen in the Spiegelman[1] report.

Lifetime earnings

The importance of the discount rate swamps the present value of lifetime earning differentials attributed to educational level. The first break of relevance appears between the 10th grade and high school graduation. Using conservative estimates of lifetime earnings from the 1960 census (adjusted) and a discount rate of 2%, the difference in return to the additional education has an expected value (for white males) of $9,300 discounted to present value. For non-white males the figure is $11,500, with a similar differential for females. As an indication of the sensitivity to the discount rate, the difference in present value reduces to approximately $1,000 as we raise the interest rate to 5%.

Juvenile Crime

Closely related to the educational level attained is the probability of being arrested for juvenile crime; presumably the PACE ID Program operates both directly and indirectly to reduce this probability. The

---

[1]Spiegelman, Robert, et al., "A Benefit/Cost Model to Evaluate Educational Programs, (SRI Project 6179, prepared for the U. S. Office of Education), Menlo Park, California: Stanford Research Institute, 1968.

social returns to a reduction in juvenile crime are reduced costs to the victims and the costs assumed by the general populace for detection, detention, etc. Available estimates in California suggest a comparative figure of $1,390 per delinquent, thus each Pacer prevented from becoming a juvenile offender saves the community at least $1,000 per arrest. There is considerable evidence to suggest that there are repeated arrests for offenders and this figure may be too low.

Probability of High School Graduation

The effectiveness of PACE in changing the probability of high school education (theoretically) could be estimated by pre- and post-AML test score distribution adjusted by transition matricies using a Markov chain.

Other Benefits

The accumulated figures preclude the necessity for discussing other benefits such as probability of college, obvious inter-generation effects, or direct increases in achievement unrelated to educational attainment.

Summary

Therefore, making the assumption that lifetime earnings measures the economic value of the individual's contribution to society and using a discount rate of 2%, we find that if one Pacer who would have dropped out after the 10th grade and became a juvenile offender graduates and stays out of juvenile court, the social benefits, properly discounted, are somewhere above $10,000.

The incidental benefits of the project, if this dollar figure is reasonable, suggest that the value of the social worker to a community for (on the average) reclaiming two children a year is sufficient to pay for the social worker and the related overhead costs.

Particularly since this project is focused on potential multi-problem families rather than actual, it appears highly likely to this team that the project has paid for itself (in terms of social benefits to the community at large). If this is true, and if there is no loss due to case load and other transfer payments of this type, it is possible to argue that any information from the project is a windfall gain. In fact it costs the larger community nothing, since the project is paid for in terms of welfare benefits and all additional information is free. This is in contrast to the argument that perhaps there is an decrement of information lost due to opportunity costs accrued from sub-optimal organization within the project.

Break-even Region

It should be noted that the project was oriented towards both identification and intervention. However, the incidental accrued benefits of social work relate only to the intervention dimensions, that is, identification without intervention becomes sterile insofar as incidental benefits are concerned. On the other hand, there may be accrued benefits from simple identification pending validation of the identification instrument. For example, longitudinal measures taken at an appropriate time, between the 10th and 12th grade in high school, would allow a comparison to determine whether the AML scale in fact identified potential high school dropouts. In Figure 2 we have indicated some very rough social cost estimates as prepared in the Spielgman report.

Figure 2

ESTIMATED SOCIAL COST

Public Health and Welfare Services (ADC)	$148.00
General Assistance (and especially alcoholics)	90.00
Public Health Division (half-hour home visit)	12.83
Mental Health Services (state hospital per month)	503.00
Probation Department	
Juvenile Hall per day	17.99
Mean unit intake case per 12 months	557.91
Transfer payments lost (chronic absences)	86.60
Educational handicapped per case	1500.00

From these figures a very rough break-even region may be estimated, using as direct and variable costs the estimates given in the final report of the PACE I.D. project for an ideal intervention center. This contains the assumption that the estimate of the existing staff relative to benefits accrued on returns to scale and organization system are within a region of satisfactory attainment (rather than optimality).

Incommensurables

One of the inherent problems in an analysis of this type is the validity of the underlying assumptions relative to the social value of some institutions within our culture. It is probably true that individuals embedded within a culture are more adapted to the degree that their values and those of the culture are congruent. On the other hand, it does not necessarily follow that the culture progresses as congruency increases. In the evolution of a species, mutation is a necessary device for

adaption and it probably should not be overlooked that a program of this type is basically mutation reducing. Hopefully, however, it could be treated as mutation selective. However, the time horizon of effective mutation is probably such that it will be impossible to predict and discriminate between desirable and undesirable mutations.

It is feasible that this is a program which will minimize teacher emotional costs rather than maximize benefits to future generations. That is, the inter-generation effect could be actually negative.

Perhaps a better and equally reasonable assumption to make would be that the human mechanism is sufficiently adaptive to survive both the educational system and social workers if it is necessary to do so. Indeed, the appropriate assumption is probably that (in the aggregate) society will retain the benefits of social welfare programs and ultimately discard the disadvantages.

RESEARCH COMMENTARY

The remarks in this section consist of questions which have been raised by the large variety of persons participating in this study. No effort has been made to delete individual bias or to present counter arguments. They simply represent what appeared to be a possible alternative interpretations.

Commentary has been clustered into four major headings: (1) AML Scale, (2) Social Worker, (3) School System, and (4) Research Design. These categories are somewhat arbitrary and are in reality highly interdependent. Nevertheless we hope this rough classification system will aid the reader.

AML Scale

The AML scale appears to be symptomatic. The assumption that an increment of AML could be sensitive to permanent type alterations in family structure and responsive to those changes seems very unlikely.

It is implied in the system that an incremental change in the AML scale is roughly equivalent to an incremental change in long-term behavior toward adjustment. This assumption is highly unlikely to be valid and the "within" variance on the AML scale is highly likely to swamp any measurable effect on long-term behavior or even lose reliability when used as a symptom of long-term behavior.

It is implicitly assumed that the old way of identification was to use a school psychologist, and that the new way is to use the AML scale. The AML scale is simply a way of asking teachers which students need help. It would be cheaper to just ask the teachers.

If AML identified problems are sufficiently serious to warrant family intervention, can we reasonably expect any quick or permanent change in behavior of the child who is presumably a symptom anyway? That is, the AML scale purports to measure the symptoms of a serious underlying problem and then also purports to measure this underlying change. It seems highly unlikely that it can do both things.

The AML scale does not seem adequately validated (with double blind tests, etc.); a more adequate testing phase seems desirable before actual usage.

Note that twice as many families were marked severe by a social worker at the end of the project than at the start. Is this a measurement or an effect?

Note that if scores are clustered by teacher rather than students, significance of score will go up. That is, the second-grade teacher at the start of the project rates three groups. A significant increase of the M scale for the experimental group may simply indicate an increased perception by the teacher.

The experimental group is targeted, the teacher receives feedback, and the teacher knows who are in the experimental group, but theoretically does not know who the control group is. This seems a naive assumption as the teachers (in effect) place the subjects into the groups.

The AML scale measures teachers' behavior rather than child behavior, or at least contains in its variance a great deal of teacher behavior relating in particular to whether the teacher is bugged by certain types of behaviors.

AML may identify and communicate, but is probably questionable as measurer of change. There is a substantial bias problem inherent and there have been no unobtrusive measures utilized as a cross-check.

If the objectives of the program are to reduce anti-social behavior in the classroom, there may be much more economical ways to do this. For example, centralizing problem children and policing.

Hypothesis: AML scores are strongly subject to teacher bias and teachers will literally control the scores to (perhaps knowingly) place children in the program.

Social Worker

It is assumed that social workers contacts and, therefore, costs are independent of one another and a stable probability distribution in the population. Attempts to determine a "proper" workload for social workers have not resulted in acceptable standards to date.

Note that it is assumed that a $14,000 a year social worker is more effective than a $10,000 a year social worker. The lack of clear specific objectives makes this assessment of effectiveness questionable. The effectiveness per dollar expended is, while important, unknown.

Note that it is assumed that a contact with a social worker reduces the probability of additional contacts with the social worker. This is highly questionable, the reverse is probably true.

There is no estimate of marginal returns for an increased case load while the proposed center has a very low case load. It is assumed that the returns from lower case loads are more than proportionately increased. There is no appropriate measure for this.

Social workers are acting as "lawyers," and getting particular children attention. Note that in the experimental group 13 got into special classes and of the control group only 2 got into special classes. If we want to look at the data another way we can argue that social workers obviously increased bad behavior. Surely, social workers can't have it both ways.

If the objectives of the program are to identify families who are not currently, but have a relatively high disposition of becoming multi-problem families. There may be negative dollar benefits if all we're doing is getting an inevitable social problem onto welfare rolls more rapidly.

The whole program is symptom suppression oriented.

Hypothesis: (1) Receipt of services of a social worker increases the probability of demanding further services, (2) Amplifies existing problem, (3) Focuses attention of actors on the problem (may be good or bad).

Hypothesis: Attention of a social worker in the school is reinforcing to the child, therefore, sustaining whatever behavior needs to be done to maintain attention of social worker, that is, potentially increases the probability of activities which will demand the attention of social workers by reinforcing unwanted behavior.

Hypothesis: Social workers have a high personal need to intervene.

Hypothesis: Competence (of social workers) is very critical, but is not well-specified.

Hypothesis: Major benefit from the low case-load consists of extended commitment, that is, year-round service, allowing the social worker to

be client attached, and reducing the need for the family meeting new social workers, also reduces the problem of data exchange between social workers.

Hypothesis: Small case-load allows social workers freedom to avoid standardization and to specialize on talents. This may be better for the individual family and self-actualizing for the social worker but is not an economically effective use of the social workers' time.

School System

It is assumed that there is a learning rate loss in the classroom by other children. This may, in fact, not be true. The content of the material learned may be different from that planned. The amount learned may be greater.

Hypothesis: Teacher manipulates scores to focus attention on children that they; (1) like, (2) dislike, (3) think need help, (4) interfere with teacher's sense of order, etc.

Teachers are actually rating whether they like particular social workers.

Hypothesis: The perception of benefit from either the teacher or the principal is a function of a particular social worker.

Peripheral participants such as teachers or principals did not scale but dichotimized social workers into good and bad.

Hypothesis: Something is wrong with the system if it needs an artificial mechanism to simply provide communication from the teacher to identify potential behavioral explosions. They might need social workers to cope with the explosions, but it is unusual that they would need an artificial device for identification.

Research Design

They select the top 10% and turn social workers loose on them. There was no recognition of possible differential benefits at different levels of scores. The problem is a multiple discriminative analysis situation, and in fact the top 10% scores may not be the worst in the population.

If experimental group families went to a large number of new agencies in the community which had not been used before, it can be argued that early referral would produce a beneficial trade-off as they will go to a medical clinic when appropriate, rather than juvenile court. However, no test was done to determine the truth of this proposition. This may be another incidental benefit to the program if it turns out to be educational in teaching the populace what welfare benefits are available. However, there is some question as to whether this is good or not.

From the principals' viewpoint; why does he need the whole program with all the other overhead cost? Why doesn't he just hire social workers. That is, there is no estimate of the minimum amount of social work any particular school has to buy to get the benefits.

No unobtrusive measures. USOE should require an evaluation mode with every proposal providing measures of effectiveness before the fact.

Program is probably "good" because it is investment oriented and the costs are not "sunk" in the sense that these dollars will continue to accrue benefits.

The whole problem is a sort of a canonical correlation. There were at least some effect with multi-variante outputs as well as inputs. There are no measures set up to consider this problem.

It is impossible to develop an adequate cost-benefit study without priority measures set up like a "strong interference" set with automatic data fall-out into a model.

No comparison with the effectiveness of social workers of this type versus social workers of any other type versus teacher intervention.

Most teachers are ego involved and will introduce a problem of within group variance which may mask between group variance of particular AML ratings.

Possible unobtrusive measures would be participation of parents in other school related activities, that is, what happens to the percentage membership attendance at, say PTA. As measures of effectiveness, there should be records on attendance of child, participation of parents, divorce rate, problems of parents, etc., usage of community facilities, (particularly medical clinics), and production of tax-supported benefits rather than the other way around.

No measures were taken on the negative changes as the PACE program has started to withdraw, that is, what is the relative investment versus operating effect of social workers.

Are we training children, parents, teachers, or social workers?

The value of the program has to turn on <u>long-run</u> behavior change. The identification of "bombs" is not enough; they must be defused. Any program that attends the individual will defuse for the short-run and could be done at a considerably lower dollar cost per case.

We want to maximize the <u>ratio</u> of corrective to supportive therapy. Supportive therapy will probably be the only thing available at high school levels and above.

The value of the project turns on the identification of the probability of explosion, the conditional value of the explosion, and therefore, expected value. No measures or controls were introduced for these results.

There are no alternative strategies of permanent tension reduction tested. There is no identification of tension inputs, no testing of dissipation of the summation of tensions in any functional way. No evaluation built in to estimate whether the probability of becoming a multi-problem family is reduced.

Note that at an 8% discount rate the benefits of completing high school are actually negative. This would suggest that our system has changed to the point where there are negative economic returns to education, (obviously an extreme position).

Hypothesis: The research design limited the case load and made the cost per case exorbitant and was itself useless.

CONCLUSIONS

On the balance the team feels that the general public probably got their money's worth out of the project (in terms of incidental benefits). However, the opportunity losses, in terms of additional information which could have been gained with the addition of unobtrusive measures planned before project inception, were great.

Possible additional data would include validity and reliability measures of the test instrument and evaluation of potential designs to actually evaluate the effectiveness of the activities of the program. A variety of similar criticisms of this type appear relevant.

This is not to imply that the management and operation of the actual PACE I.D. center was defective. Due to the lack of valid long-range measures we have made no analysis as to the internal effectiveness of the PACE I.D. project. It is interesting that none existed however.

If these comments are viewed as an indictment they are not an indictment of PACE I.D. management, but of management control of the higher order. That is, the opportunity losses were substantial and it is the general conclusion of the project team that a higher ratio of prior planning to direct activities could have yielded substantially greater benefits differentially and on the margin from this particular project.